

DENTAL CARES EXPERIENCE AMONG TOBACCO CONSUMING

TRUCK DRIVERS IN NORTH CHENNAI, INDIA

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ABSTRACT

Background and Aim: Tobacco use is one of the greatest threats to global health today and it is high among the people of low socioeconomic status. Studies indicate that truck drivers who belong to the low socioeconomic class are at higher than average risk for tobacco related diseases. Therefore, a study was done to evaluate the effect of tobacco consumption on dental caries experience among truck drivers in North Chennai.

Material and Methods

A cross-sectional study was done among 700 tobacco consuming truck drivers. Participants were interviewed and clinically examined to record the DMFT score (Decayed, missing, filled teeth) (according to WHO 1997 criteria). Chi-square test and one-way ANOVA was performed to determine the significance between the groups.

Results

Participants were categorised based on the type of tobacco use. The mean DMFT score [7.07 (± 2.67)] was more among the smokers (Group 1). The tobacco chewers (Group 2) had the lowest mean DMFT score [6.55 (± 2.38)]. The difference between the groups based on DMFT score was statistically significant (p value < 0.05).

Conclusions

From this study, it was evident that tobacco consumption in any form, either smoking or chewing, appears to have a positive effect on caries experience.

KEYWORDS: Dental Caries, DMFT, Smokers, Tobacco

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INTRODUCTION

The epidemic of tobacco use is one of the greatest threats to global health today.¹ India accounts for nearly one third of an estimated three million tobacco-related deaths in the world per year. The tobacco situation in India is unique because of a vast spectrum of tobacco products available for smoking as well as smokeless use.²

Studies show that there is plausible association between tobacco use and higher incidence of dental caries³⁻⁵. In smokers, the cigarette smoke alters the salivary function, leading to dental caries.^{6,7} Research indicates

that even passive smoking can be a risk factor for dental caries experience.^{8,9} Whereas, in case of smokeless tobacco use, researchers have shown that there is increase in salivary flow rate¹⁰⁻¹² This could be due to presence of high amount of fermentable sugars and sweeteners added to it, which is sufficient enough to promote dental caries.^{3,4,13}

Partly because of the misperceptions about the perceived benefits, that tobacco use aids in concentration, suppresses appetite, reduces anxiety and tension, and induces feelings of pleasure, tobacco consumption is highest in the labour classes.¹⁴ Reports from several studies indicate that truck drivers are poorly educated and they are at higher than average risk for tobacco related diseases.^{15,16}

Therefore, this study was done to evaluate the effect of tobacco consumption on dental caries experience among the truck drivers in North Chennai. This population was targeted to carry out the study, because until date, no epidemiological investigations had been documented among them, who are much habitual to tobacco use.

MATERIALS AND METHODS

A descriptive cross-sectional study was carried out during January-May 2013, in a container terminal yard, Container Corporation of India (CONCOR), located in North Chennai. In Chennai, there are two terminal network areas, Tondiarpet and the Harbour of Chennai.¹⁷ Due to the availability of the truck drivers in the Tondiarpet terminal yard, this study was carried out in the Truck Operators Association office room, where the drivers with the habit of tobacco consumption were examined. Ethical Clearance was obtained the University Institutional Review Board. Informed consent was obtained from the study subjects.

Based on the mean DMFT values obtained from pilot study the sample size required for the main study was calculated to be 626 subjects. The list of transport companies that had alliance with the CONCOR, Chennai, was obtained from the Head office in Tondiarpet. Then the number of drivers working for the concerned transport company was obtained. Due to the irregular duty pattern of the drivers, all those present at the time of the study were included in the study.

A pretested and closed ended questionnaire was used to gather information concerning the demographic details, the oral hygiene practices and dietary habits of the drivers. The list of sweet and sugar-sweetened foods and the frequency with which they were consumed were recorded using a twenty-four hour diet recall method. The consumed sweet was classified and scored based on the criteria given by Raham E. Nizel.¹⁸

A single, trained and calibrated examiner recorded the caries experience of the subjects based on the WHO criteria (1997).¹⁹ ADA type 3 examination was carried out in the drivers' association office room.

The data was processed using SPSS Software Version 17[®]. Pearson's Chi-square test was performed to determine the significance of associations between demographic characters and habits. One-way ANOVA was employed to find the difference among the groups. A *p* value of <0.05 was considered to be statistically significant.

RESULTS

The study consisted of 700 volunteers primarily categorised into three groups based on the type of tobacco use. Group1 had 117 (16.7%) subjects who only smoked tobacco, Group2 included 224 (32%) subjects who reported of using smokeless tobacco only and Group3 consisted of about 359 (51.3%) subjects who reported that they smoked as well as chewed tobacco.

The age of the study subjects ranged between 20-39 years. The overall work experience of the study subjects ranged from 1-20 years. The monthly income of the study subjects ranged from 4000-8000 rupees. The mean age, years of work experience and monthly income was found to be almost same in all the three groups (Table1).

About 92% of the participants were educated and remaining 8.1% were uneducated (Figure1). All the subjects (n=700) reported that they brushed once daily with toothpaste and toothbrush and they used horizontal strokes to brush their teeth. The sugar score for all (n=700) the subjects was 15 or more therefore all of them were categorised to be in the watch out zone as sugar consumption was excess.

The difference in the mean DT (decayed teeth) and mean MT (missing teeth) score between the three groups was statistically significant (ANOVA, $p < 0.01$). Whereas, the difference in the mean FT (filled teeth) score was statistically insignificant (ANOVA, $p < 0.2$) (Table 2).

The caries experience was more for Group1 subjects, followed by Group2 and comparatively less in Group3 subjects. The mean DMFT score for Group1 was 7.07 (± 2.6); Group2 was 6.55 (± 2.3) and Group3 was 6.32 (± 2.5). The difference between the three groups was statistically significant (ANOVA, $p < 0.01$) (Figure 2).

Maximum participants required a one surface or two surface filling, followed by extraction and pulp therapy. (Table3).

DISCUSSIONS

The primary goal of this study was to evaluate the effect of tobacco use on dental caries. The study population targeted were tobacco using truck drivers, because they are at a higher than average risk for tobacco related diseases, including changes in the bacterial ecology and overall poor oral hygiene. In addition to this, drivers may have a different lifestyle habits that further modify the oral health.¹⁶

A cohort of 700 truck drivers were categorised into three groups based of the type of tobacco consumed. Majority of them used both forms of tobacco (smoking and smokeless tobacco), the second being the smokeless form followed by tobacco smoking. The reasons for low prevalence of tobacco smoking could be the fact that cigarettes are eight to 10 times more expensive than bidis, which are somewhat more expensive than smokeless tobacco products. Therefore, financial considerations may also partly explain the high proportion of increased smokeless tobacco users.²⁰ Another reason is the outlawing of smoking in public places could increase the popularity of smokeless tobacco, which is an alternative to tobacco smoking.²¹

A study done by K M Venkat et al.²² documented that education was the strongest predictor of tobacco use, men with no or less education were 1.8 times more likely to use tobacco than those with college education. The results of the present study are in accordance with a study done by Jindra et al.²³ which reported that majority (44%) of the regular smokers had only basic education. The Indian national family health survey 1998–99 observed a strong gradient between education and chewing; the odds of chewing in educationally worst off group was 1.84 times higher that of people with post graduation and thus sometimes becoming an issue of social status concern for the educated people not using chewing tobacco.²⁴

In the present study all the subjects (n=700) were exposed to excess sugar consumption, as all of them were in the watch out zone. High sugar exposure seen in the subjects was due to over-consumption of beverages, preferably coffee and

tea. The recorded twenty-four hour diet chat revealed that the participants consumed beverages atleast 5-15 times a day. Truck drivers reported that, they consumed beverages as source of refreshment during the night and early morning working hours.

The results of several clinical investigations concluded that the frequency of ingestion of sugar-containing foods or between-meal snacks was related directly to the development of dental caries in adults.^{6,25,26} Comg and colleagues¹³ showed evidence that frequent exposure to refined sugar along with tobacco chewing may prove significance in the initiation of dental caries.

Dental examinations revealed that the mean DMFT score for Group1 was 7.07 (± 2.6); Group2 was 6.55 (± 2.3) and for Group3 mean DMFT score was 6.32 (± 2.5). The difference between the three groups was statistically significant (ANOVA, $p < 0.01$). The findings of this study are in accordance with the study done by Scott L. Tomar et al.²⁷ which recorded a DMFT score of 7.09 among former smokers. Aguilar-Zinser et al.¹⁶ in his study recorded a mean DMFT score of 8.95 (± 6.05) among truck drivers in Mexico. In contrast, the DMFT score of the present study is low when compared to a study by G. Campus et al.²⁸ which recorded a mean DMFS score of 11.2 ± 0.5 .

In contrast the DMFT score of this study seems to be more when compared to results the study done by T. Rooban et al.²⁹ which showed that the mean DMFT was 2.89 for those who abused tobacco in smoke and smokeless forms. Athra M. Al-Weheb.³⁰ in her study recorded a DMFT score of 5.93. Gambhir et al.³¹ in his study among transport workers recorded a mean DMFT of the 5.02, and the mean number of decayed and missing teeth were 1.67 ± 2.16 and 1.46 ± 2.8 .

A biologically explanation for an association between chewing tobacco and dental caries may be the presence of high levels of fermentable sugar in chewing tobacco products, which can stimulate the growth of cariogenic bacteria. Locally prepared and commercially available chewing tobacco in India, like Pan masala and Gutka, contains areca nut, tobacco, cardamom, lime and are sweetened with unrefined sugar, sugar crystals, coconut or artificial sweeteners and flavours. Chewing tobacco is typically used by placing a wad of tobacco between teeth and buccal mucosa, and is gently chewed or sucked for a long time. This situation can create conducive environment for the initiation of dental caries by release of sugars from chewing tobacco to the local environment or oral cavity.²⁴ One possible contributory mechanism in the development of root-surface caries among chewing tobacco users is gingival recession, which exposes the root surface to cariogenic bacteria.²⁷

It has been demonstrated that, in smokers, the cigarette smoke impairs salivary function, which has an important protective role against dental caries.^{32,33} However, sugars also promote tobacco smoking, because they generate acids that neutralize the harsh taste of tobacco smoke. Moreover, the sweet taste and the agreeable smell of caramelized sugar flavours are appreciated in particular by starting adolescent smokers.³⁴

From the clinical examination, it was evident that in the present study, majority of them required a single surface or a two surface restoration. Most of the participants had not replaced their missing teeth, as they addressed that tooth once lost need not be replaced, as it is of no use and a wearing a denture is uncomfortable. Typical situation where tooth extraction was taken into consideration as a form of treatment were larger fracture, profound caries lesion with destruction of a large part of crown, acute pain or abscess caused by pulpal or periodontal involvement. A negative attitude to the preservation of natural teeth might lead to situation where tobacco users in general prefer tooth extraction instead of more conservative treatment.

The findings of the present study is in contrast to the study conducted by Chinmaya B R et al.³⁵ where the results showed that, 35.7% of subjects needed fillings, 5.2% required crowns and veneers, 6.5% needed pulp care, 16% needed extraction and 6.5% required a prosthesis.

Since the confounding factors like oral hygiene practices and exposure to high level of sugary diet, were present in all the three groups, its effect on caries experience can be nullified.

The study exhibits some limitation that needs to be addressed when interpreting the findings of the study, although general information about tobacco status was obtained, other information about the forms of tobacco use (cigarette, beedi, gutka, paan, mawa etc.) was not recorded, as various chewing tobacco products have different sugar content. An exact comparison of this data with the other literatures of the same target population and in comparison to the Indian context was not always possible because of the lack of research done among the truck drivers with tobacco use, and caries experience. Correlation between demographic features and tobacco use was not measured. Finally, the present study has the typical limitation of a cross-sectional survey; therefore, we were not able to establish the definite sequence of exposure and disease, as whether tobacco use preceded caries experience.

CONCLUSIONS

From the study, it was evident that the DMFT score was more in the smokers than tobacco chewers. Most of them required a one or two surface restorations. Therefore, the study documented that, tobacco in any form; either smoking or chewing, appears to have a positive effect on the caries experience. Preventive public health care programs with special emphasis on oral health education and tobacco cessation services needs to be planned, with appropriate and feasible strategies to improve the oral health of this population.

REFERENCES

1. **V.K. Vijayan and Raj Kumar** - Tobacco Cessation in India, *Indian J Chest Dis Allied Sci* 2005; 47: 5-8.
2. **PK. Nag, Sunil Kumar, PR. Tiwari, Shruti Patel, Shiva Murarka- Envis- Nioh**, Newsletter, Vol 4, No 2, Apr-Jun 2009.
3. **Roushdy M.M.** - Association of Dental Caries, Streptococcus Mutans Counts and Secretory IgA with Tobacco Smoking, *Australian Journal of Basic and Applied Sciences*, , ISSN 1991-8178.
4. **Jane A. Weintraub, Brian A. Burt** - Periodontal Effects and Dental Caries Associated with Smokeless Tobacco Use, *Public Health Reports - January-February 1987*, Vol. 102, No. 1.
5. **K. Bruno-Ambrosius, G. Swanholm & S. Twetman** - Eating habits, smoking and tooth brushing in relation to dental caries: a 3-year study in Swedish female teenagers, *International Journal of Paediatric Dentistry*, 2005;15:190-196
6. **George K. Stookey** - The effect of saliva on dental caries, *JADA* 2008;139(suppl 2):11S-17S.
7. **C. Fenoll-Palomares, J. V. Muñoz-Montagud, V. Sanchiz, B. Herreros, V. Hernández, M. Mínguez and A. Benages** - Unstimulated salivary flow rate, pH and buffer capacity of saliva in healthy volunteers, *Rev Esp Enferm Dig (Madrid)* Vol. 96, No 11, pp. 773-783, 2004.
8. **Smara Carbajosa García and Carmen Llena Puy** - Relationship Between Tobacco Smoke and Dental Caries in School Children at the Valencian Country, *Rev Esp Salud Pública* 2011; 85: 217-225 N.º 2 - Marzo-Abril 2011.
9. **Jonathan D. Shenkin, Barbara Broffitt, Steven M. Levy, John J. Warren** - The Association Between Environmental Tobacco Smoke and Primary Tooth Caries, *Journal of Public Health Dentistry* Vol. 64, No. 3, Summer 2004.

10. **Ghulam Jillani Khan, Rashid Mehmood, Salah-ud-din, Ihtesham-ul-Haq** – Effect of chronic tobacco use on salivary concentrations of sodium and potassium, *J Ayub Med Coll Abbottabad*, 2003;15(1).
11. **C. R. Trivedy, G. Craig & S. Warnakulasuriya** - The oral health consequences of chewing areca nut , *Addiction Biology* (2002) 7, 115- 125
12. **Millard D. Gibbs** – Tobacco and Dental Caries, <http://legacy.library.ucsf.edu/tid/lxm71b00>.
13. **Rochelle G. Lindemeyer, Robert H. Baum, Stephen C. Hsu and Robert E. Going** - In vitro effect of tobacco on the growth of oral cariogenic streptococci, *Journal of American Dental Association* 1981 Nov;103(5):719-22.
14. **Zaki Anwar Ansari, S Nafees Bano, and M Zulkifle** - Prevalence of Tobacco Use among Power Loom Workers - A Cross-Sectional Study, *Indian Journal of Community Medicine*, 2010 January; 35(1): 34–39, Doi: 10.4103/0970-0218. 62551.
15. **Allard J Van Der Beek** - World at work: truck drivers, *Occup Environ Med* 2012;69:291e295. DOI:10.1136/oemed-2011-100342.
16. **V. Aguilar-Zinser, M.E. Irigoyen, G. Rivera, G. Maupom, Sánchez-Pérez and C. Velázquez** - Cigarette Smoking and Dental Caries among Professional Truck Drivers in Mexico, *Caries Res* 2008;42:255–262, DOI: 10.1159/000135670.
17. <http://www.concorindia.com>.
18. **Raham E. Nizel and Thena S. Papas** – Nutrition in clinical dentistry, third edition, 1989, W.B. Saunders Company.
19. “Oral Health Surveys – Basic Methods”, 4th edition, WHO 1999. Geneva. A.I.T.B.S. Publishers and Distributors, Delhi.
20. **Prakash C. Gupta** – Survey of sociodemographic characteristics of tobacco use among 99598 individuals in Bombay, India using handheld computers, *Tobacco Control* 1996; 5:114-120.
21. **OO Desalu, KR Iseh, AB Olokoba, FK Salawu, A Danburam** - Smokeless tobacco use in adult Nigerian population, *Nigerian Journal of Clinical Practice*, Dec. 2010 Vol. 13(4):382-387
22. **K M Venkat Narayan, S L Chadha, R L Hanson, R Tandon, N Gopinath** - Prevalence and patterns of smoking in Delhi: cross sectional study, *BMJ* 1996; 312:1576-9.
23. **Jindra Smejkalova, Vimal Jacob, Lenka Hodacova, Zdenek Fiala, and Sajith Vellappally** - The Influence of Smoking on Dental and Periodontal Status, *Oral Health Care – Pediatric, Research, Epidemiology and Clinical Practices*, www.intechopen.com.
24. **Sajith Vellappally, Zdeněk Fiala, Jindra Šmejkalová, Vimal Jacob** - Influence of tobacco use in dental caries development, *Cent Eur J Public Health* 2007; 15 (3): 116–121
25. **Robert L. Weiss and Albert H. Trithart** - Between-meal eating habits and dental caries experience in preschool children, *A.J.P.H.*, VOL. 50. NO. 8, August. 1960.
26. **B.A. Burt, S.A. Eklund, K.J. Morgan', F.E. Larkin, and J.A. Weintraub** - The Effects of Sugars Intake and Frequency of Ingestion on Dental Caries Increment in a Three-year Longitudinal Study, *J Dent Res* 67(11):1422-1429, November, 1988.
27. **Scott L. Tomar, Deborah M. Winn** - Chewing tobacco use and dental caries among U.S. men, *JADA*, Vol. 130, November 1999.
28. **G.Campus, M.G. Cagetti, A. Senna, G. Blasi, A. Mascolo, P. Demarchi, L. Strohmeinger** - Does Smoking Increase Risk for Caries? A Cross-Sectional Study in an Italian Military Academy, *Caries Res* 201; 45:40–46, DOI: 10.1159/000322852.
29. **Thavarajah Rooban, KM Vidya, Elizabeth Joshua, Anita Rao, Shanthi Ranganathan and K Ranganathan**- Tooth decay in alcohol and tobacco abusers *Journal of Oral Maxillofac Pathol.* 2011 Jan-Apr; 15(1): 14–21.

30. **Athra M. Al-Weheb** - Smoking and its relation to caries experience and salivary lactobacilli count, *Journal of College Dentistry* Vol. 17(1), 2005.
31. **Ramandeep S. Gambhir, et al.** Dental health status and treatment needs of transport workers of a northern Indian city: A cross-sectional study. *Journal of Natural Science, Biology and Medicine* 2013;4.
32. **Nils Homann, Jyrki Tillnonen, Jukka H.Meurman, Hanna Rintamaki, Merja Rautio and Mikko Salaspuro** - Increased Salivary Acetaldehyde levels in heavy drinkers and smokers: a microbiological approach to oral cavity cancer, *Carcinogenesis*, Vol 21, No 4, pp 663-68, 2000.
33. **SC Leal, S Mickenautsch** - Salivary streptococcus mutans count and caries outcome – a systematic review, *Minim Interv Dent* 2010; 3 (4).
34. **Dr. Jitendra K. Rajani, Sangeeta J. Rajani**- Effects Of Tobacco On Oral Cavity, *Journal of Dental Sciences* Volume 2 Issue 1.
35. **Chinmaya B.R, Shaik Hyder Ali K. H, Srivastava B. K, Pushpanjali K** – Oral health status and treatment needs in chitradurga, india and strategies to meet the needs, *Archives of Oral Sciences & research* 2011;1(1):14-25.

APPENDICES

Table 1: Mean Age, Work Experience and Income of Study Subjects (Mean \pm SD)

	Group1	Group2	Group3
NO. OF SUBJECTS	117	224	359
AGE (Years)	28.81 (\pm 4.42)	28.94 (\pm 4.2)	27.93 (\pm 3.53)
WORK EXPERIENCE (Years)	6.29 (\pm 3.54)	6.07 (\pm 3.58)	5.53 (\pm 2.97)
INCOME (Rupees)	5307.69 (\pm 1070.4)	5258.9 (\pm 981.8)	5314.7 (\pm 886.6)

Table 2: Caries Experience of the Subjects. (Mean \pm SD)

	DT	MT	FT
Group1 n=117	4.4(\pm 2.57)	2.12(\pm 1.03)	0.32(\pm 0.9)
Group2 n=224	3.6(\pm 1.71)	2.4(\pm 1.57)	0.25(\pm 0.51)
Group3 n=359	4.8(\pm 2.3)	1.4(\pm 0.62)	0.11(\pm 0.01)
p value	< 0.01	< 0.01	< 0.2

p* value <0.05 is significant; ANOVA

Table 3: Treatment Needs of the Study Population

	GROUP1 n=117	GROUP2 n=224	GROUP3 n=359	TOTAL n=700	P VALUE
One surface Restoration	106 (90.5%)	93 (41.5%)	338 (94.1%)	537 (76.7%)	<0.001
Two surface Restoration	94 (80.3%)	182 (81.2%)	247 (68.8%)	523 (74.7%)	<0.001
Crown	64 (54.7%)	31 (13.8%)	144 (40.1%)	239 (34.1%)	<0.01
Pulp Therapy	78 (66.6%)	55 (24.5%)	86 (23.9%)	219 (31.2%)	<0.3
Extraction	52 (44.4%)	80 (35.7%)	147 (40.9%)	279 (39.8%)	<0.01

p* value <0.05 is significant; ANOVA

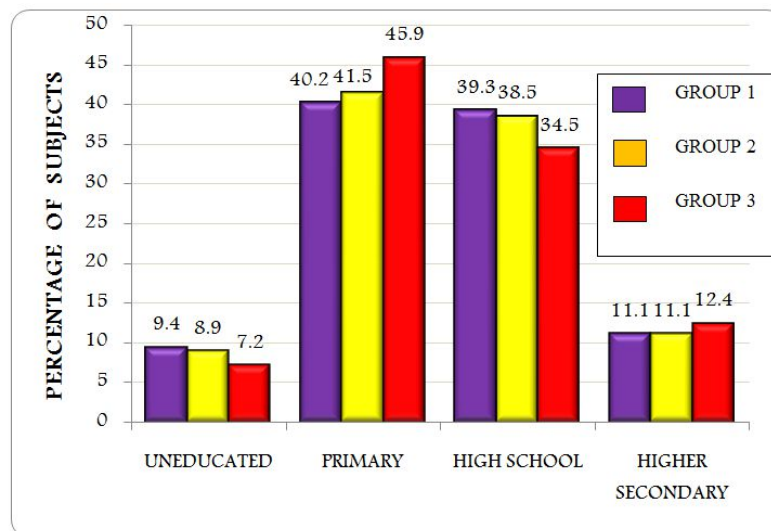


Figure 1: Educational Qualification of the Study Subjects

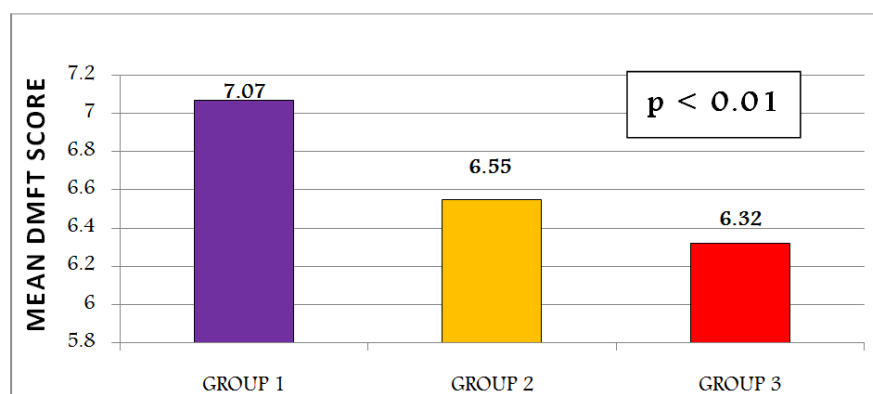


Figure 2: Caries Experience among the Study Subjects